

REMARKS

Claims 1, 14 and 25 have been amended in this response. Accordingly, claims 1 to 48 remain pending in this patent application. Applicants address each and every point raised in the above-identified Office action as follows:

I. Claims Rejected Under Section 103

Claims 1 to 48 have been rejected under 35 U.S.C. §103 as being allegedly unpatentable over Fang. As an initial matter, Applicants wish to note that they have amended independent claims 1, 14 and 25 to more clearly recite the specifics of the invention. Namely, that the low coefficient of thermal expansion (CTE) second phase binder alloy is used to bond the first phase hard grains together. This is a key feature that is very different from the invention of Fang.

Applicants low CTE material is one characterized by a first phase of hard grains, e.g., tungsten carbide (WC) that are bonded together by a second phase of a low CTE binder alloy. Thus, the low CTE binder alloy is actually used to bond the hard grains together.

Fang, on the other hand, discloses a material comprising a first region that is made of grains (e.g., WC) that are bonded together by a conventional ductile binder (e.g., Co). This first region of bonded grains are then distributed within a continuous ductile phase. Again, it is important to understand that the ductile binder that is used to bond together the first region grains is a conventional binder material and not Applicants' claimed low CTE binder alloy.

Fang discloses that the continuous ductile phase (again, not the ductile binder used to bond the grains) may be formed from a low CTE material. However, this is not what Applicants are reciting in their claims. Fang fails to disclose or remotely suggest a material composition comprising use of a low CTE material to bond together the actual grains of the first phase.

For this reason, Applicants submit that one having ordinary skill

in the art aware of Fang would not be motivated to produce Applicants' low CTE material as recited in independent claims 1, 14, 25, 33 and 43. In view thereof, Applicants submit that their invention as recited in these claims is not obvious over Fang, and respectfully requests that the rejection of independent claims 1, 14, 25, 33 and 43 under 35 U.S.C. §103, and claims 2 to 13, 15 to 24, 26 to 32, and 34 to 42 depending therefrom be reconsidered and withdrawn.

II. Conclusion

Applicants respectfully request that the rejection of claims 1 to 48 be reconsidered and withdrawn, and that these claims be passed to allowance.

**REMARKS**

Attached hereto is a marked-up version of the changes made to the above-identified application by the current amendment. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claims 1, 14, and 25 as follows:

1. (Amended) A low coefficient of thermal expansion cermet material comprising:

a first phase of grains selected from the group consisting of carbides, nitrides, carbonitrides, and borides of W, Ti, Mo, Nb, V, Si, Hf, Ta, Cr, and mixtures thereof; and

a second phase of binder alloy bonding the first phase of grains together and formed from a blend of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr, and Mn;

wherein the binder alloy has a coefficient of thermal expansion of less than about 10 ppm/°C within a temperature range of from 100 to 700°C.

14. (Amended) A low coefficient of thermal expansion cermet composition comprising:

a first phase of grains selected from the group consisting of carbides, nitrides, carbonitrides, and borides of W, Ti, Mo, Nb, V, Si, Hf, Ta, Cr, and mixtures thereof; and

a second phase of binder alloy bonding the first phase of grains together and formed from a mixture of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr, and Mn;

wherein the cermet composition has a coefficient of thermal expansion less than that of conventional WC-Co at the same temperature and having the same metal content a temperature range of from 100 to 700°C; and

wherein the binder alloy comprises in the range of from about 10 to 30 percent by weight of the total weight of the cermet material.

25. (Amended) A low coefficient of thermal expansion cermet material comprising:

a first phase of grains selected from the group consisting of carbides, nitrides, carbonitrides, and borides of W, Ti, Mo, Nb, V, Si, Hf, Ta, Cr, and mixtures thereof; and

a second phase of binder alloy bonding the first phase of grains together and formed from a mixture of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr, and Mn; and

a third phase selected from the group of materials consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, alloys thereof, and alloys with materials selected from the group consisting of B, Cr, and Mn, wherein the first and second phases [forms] form particles that are disbursed within the third phase;

wherein the binder alloy has a coefficient of thermal expansion of less than about 6 ppm/°C within a temperature range of from 100 to 700°C.